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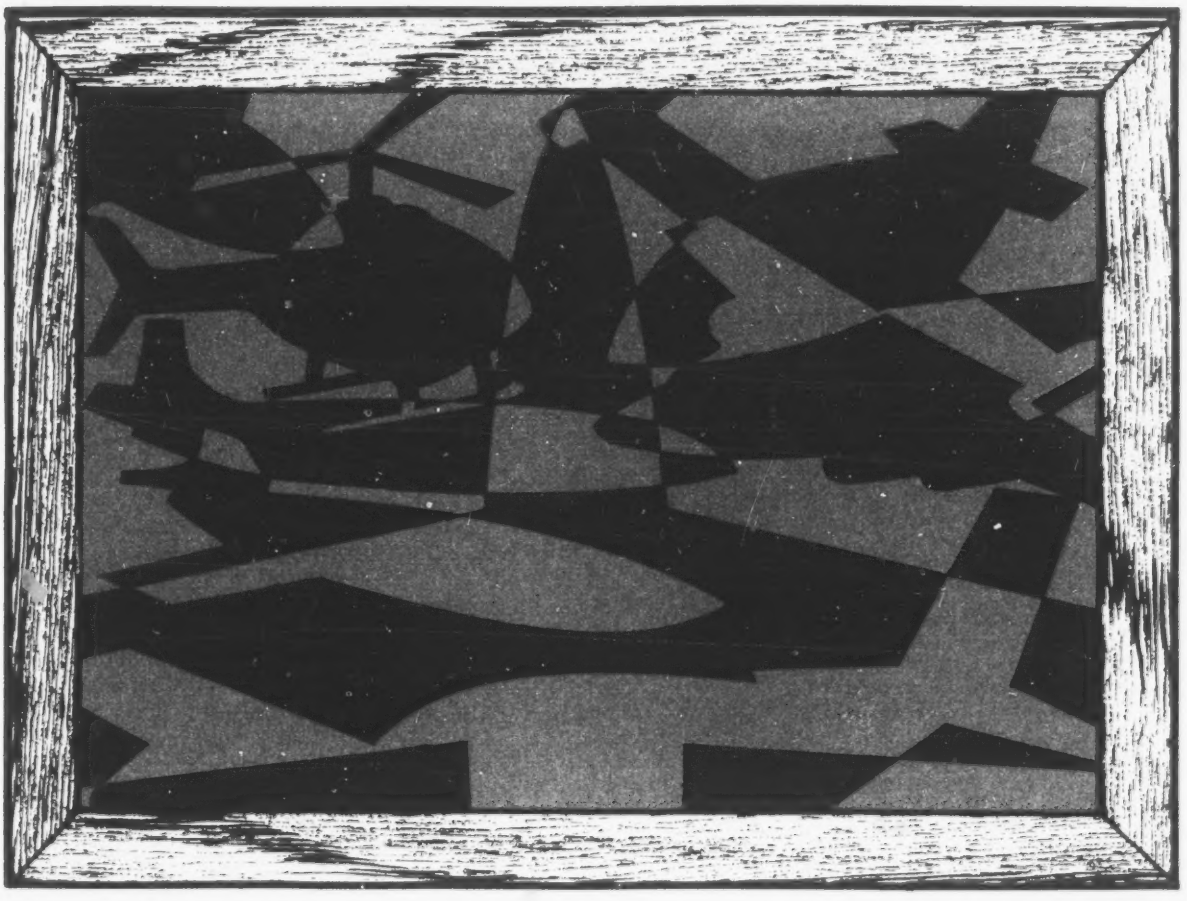
business flying

1980 Section 3

NATIONAL BUSINESS AIRCRAFT ASSOCIATION, INC.

Business Aircraft: The Industry Picture



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Introduction

The Federal Aviation Administration annually publishes a series of statistics that demonstrate how general aviation fits into the overall aviation picture and what part business and executive aviation plays in this picture. The latest published figures are those for 1978.

There is no question that general aviation is the dominant force in the sky with 99 percent of the civil air fleet, 84 percent of civil operations at FAA towered airports and close to 85 percent of the total hours flown by the U.S. civil air fleet.

General Aviation, by FAA definition, includes all aircraft operated under

Part 91: General operating and flight rules
Part 123: Certification and operations: air travel clubs, using large aircraft
Part 133: Rotorcraft external load operations
Part 135: Air taxi operators and commercial operators of small aircraft
Part 137: Agricultural aircraft operations

The FAA has divided the aircraft that operate under these flight rules into nine "primary use" categories. By definition they are as follows:

Executive: Any use of an aircraft by a corporation, company, or other organization for the purpose of transporting its employees and/or property, but not for compensation or hire, and employing professional flight personnel for the operation of the aircraft.

Business: Any use of an aircraft, not for compensation or hire, by an individual for the purpose of transportation required by a business in which he is engaged.

Personal: Any use of an aircraft for personal purposes not associated with a business or profession, and not for hire.

Aerial Application: Consists of those activities that involve the discharge of materials from aircraft in flight.

Instructional: Any use of an aircraft for the purpose of formal instruction with the flight instructor aboard.

Air Taxi: Any use of an aircraft by the holder of an Air Taxi Operating Certificate.

Industrial: Use of an aircraft for specialized work allied with industrial activity — pipeline patrol, survey, advertising, photography, helicopter hoist.

Rental: Aircraft used primarily for short periods by airmen on which fee is paid.

Other: Research and development, marketing and sales demonstration, sport parachuting, etc.

NBAA voting members are in the executive and business category.

This issue summarizes general aviation activity for 1978, postures business and executive aviation in the general aviation picture, notes past and continuing trends in equipment and avionics and includes information about fuel consumption.

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Summary

An estimated 39.4 million hours of flying time were logged by the 198,778 active general aviation aircraft in the U.S. fleet during 1978.

These aircraft had a mean annual flight time per aircraft of 197.7 hours and represented 85 percent of the registered general aviation fleet.

Turboprop aircraft flew over 510 hours per aircraft during 1978, more than any other aircraft type. Moreover, twin engine turboprops with thirteen or more seats flew more than 1,000 hours per aircraft. In contrast, single-engine piston-powered aircraft averaged fewer than 175 hours per aircraft during the year.

The most common primary use of a generl aviation aircraft was "personal; for an estimated 48 percent of the active fleet; followed by business/executive, 28 percent of the fleet; and instructional, 7 percent of the fleet.

Over 80 percent of general aviation aircraft had two-way VHF communication equipment, over 50 percent were equipped with 4096-code transponders, over 50 percent had at least one component of an instrument landing system, and over 75 percent had some form of navigation equipment.

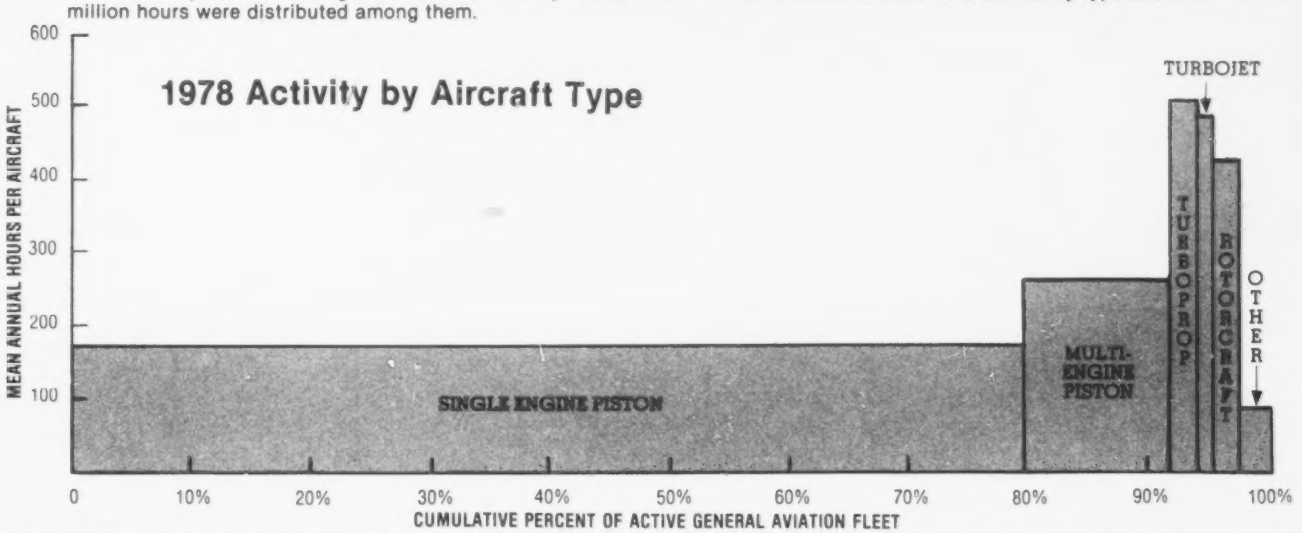
An estimated 37 percent of the active general aviation fleet flew by instrument flight rules (IFR) at some time during 1978.

The general aviation aircraft fleet consumed an estimated 1,281 million gallons of fuel during 1978, 518 million gallons of avition gasoline and 763 million gallons of jet fuel.

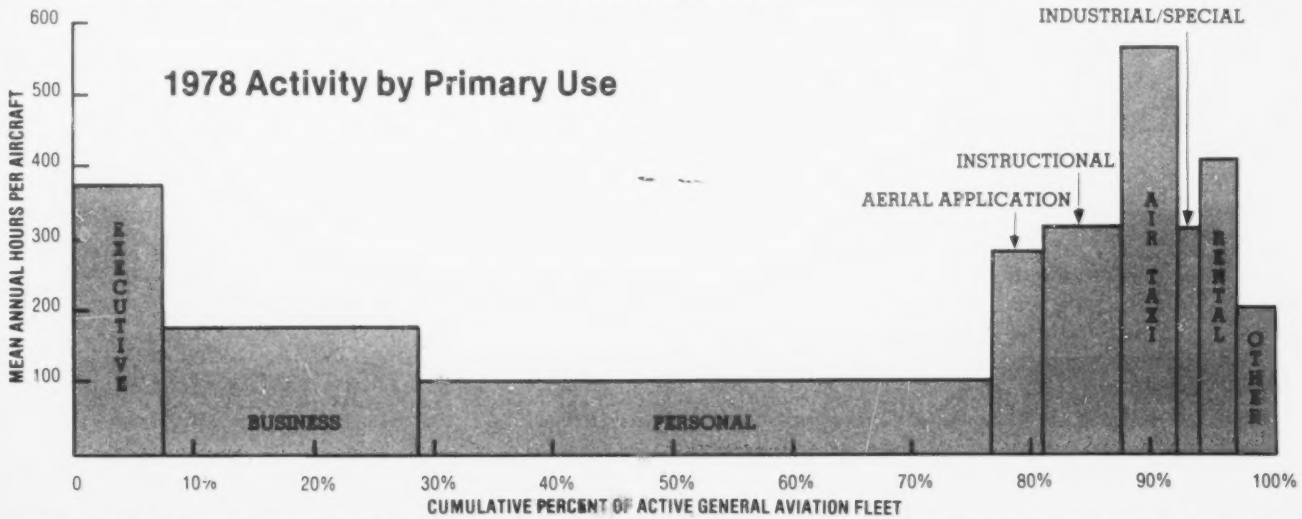
1978 Aircraft Activity — Primary Use — Type/ Hours (000)

	Total Active	Executive	Business	Total Exec/Bus	Personal	Aerial Application	Instructional	Air Taxi	Industrial	Rental	Other
FIXED-WING, PISTON											
Active Aircraft	183,823	7,979	41,823	49,802	92,756	6,817	13,972	6,086	1,831	7,756	5,367
Hours (000)	34,043	2,826	7,705	10,531	9,392	1,846	4,815	2,896	485	3,143	814
TURBOPROP											
Active Aircraft	3,130	2,195	305	2,500	37	8		444	9	10	119
Hours (000)	1,606	885	111	996	9	—	—	550	4	9	34
TURBOJET											
Active Aircraft	2,480	1,971	57	2,028	19	4	22	170	8	26	199
Hours (000)	1,194	899	43	942	5	—	10	132	1	14	69
HELICOPTERS — PISTON											
Active Aircraft	2,822	66	441	507	478	739	262	139	299	23	370
Hours (000)	806	16	95	111	20	207	99	38	151	5	170
HELICOPTERS — TURBINE											
Active Aircraft	2,492	421	199	620	34	45	7	1,075	103	106	499
Hours (000)	1,421	250	43	293	6	12	8	788	59	68	1,308
OTHERS											
Active Aircraft	4,028	32	181	213	2,881	1	476	19	7	255	173
Hours (000)	337	2	14	16	171	—	85	2	1	45	18
TOTAL, GENERAL AVIATION											
Active Aircraft	198,778	12,808	42,809	55,475	96,209	7,418	14,742	7,936	2,059	8,169	6,748
Hours (000)	39,409	4,882	8,014	12,896	9,600	2,066	5,009	4,424	702	3,284	1,308

This summary chart of 1978 general aviation activity shows how the 198,778 active aircraft were divided by type and how the 39.4 million hours were distributed among them.



In numbers alone, single engine aircraft dominate the active fleet, but these same aircraft were among the lowest utilized. Business aircraft — multi-engine pistons, turboprops, turbojets — were among the widest used aircraft.

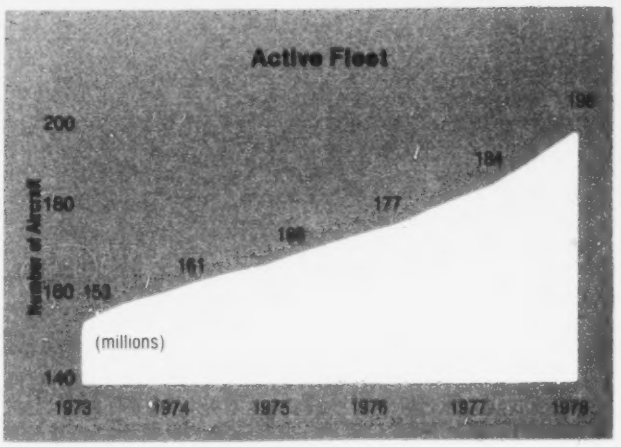


Each box of this schematic represents the relative proportion of the general aviation fleet engaged by "primary use". The area within the box is proportional to the total flying time for each primary use. Executive and business aircraft show significant utilization of aircraft compared to other categories.

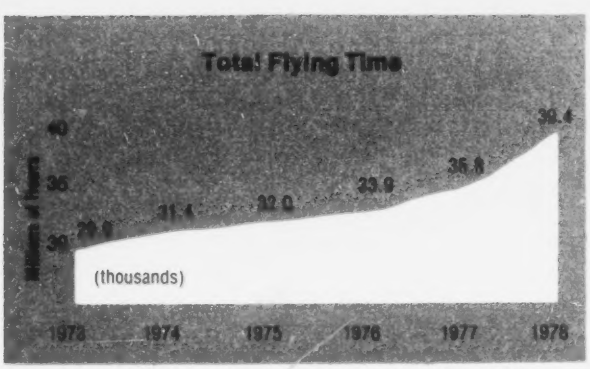
Four Year Trend in Primary Usage 1974–1978

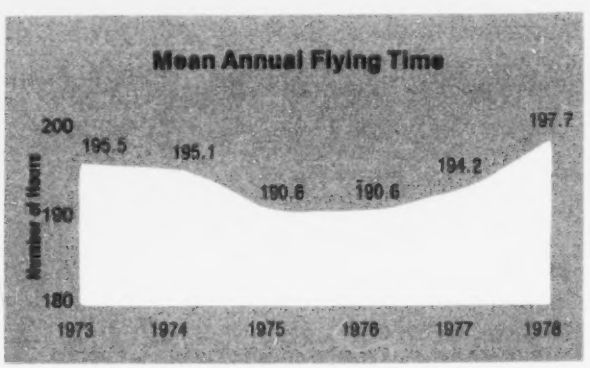
Aircraft	Year	Total	Executive	Business	Total Executive Business	Business/Executive % of GA
Single–Engine, Piston	1978	160,651	3,214	31,548	34,762	21.6
	1974	134,192			29,489	21.9
	Percent Change	+ 19.7			+ 17.9	
Multi-Engine, Piston	1978	23,171	4,764	10,074	14,838	64.0
	1974	19,372			11,950	61.7
	Percent Change	+ 19.6			+ 24.2	
Turboprop	1978	3,130	2,195	305	2,500	79.9
	1974	1,603			1,305	81.4
	Percent Change	+ 95.2			+ 91.5	
Turbojet	1978	2,480	1,971	57	2,028	81.8
	1974	1,287			1,167	90.7
	Percent Change	+ 92.7			+ 73.8	
Total Fixed Wing	1978	189,433	12,146	41,986	54,132	28.6
	1974	156,454			43,911	28.1
	Percent Change	+ 21.0			+ 23.2	
Rotary Wing	1978	5,315	487	641	1,128	21.2
	1974	3,171			607	19.1
	Percent Change	+ 67.6			+ 85.8	
Miscellaneous	1978	4,028	32	181	213	5.3
	1974	9,192			285	3.0
		-56.2			-25.3	
Total Aircraft	1978	198,728	12,666	42,809	55,475	27.9
	1974	168,817			44,803	26.5
	Percent Change	+ 17.7			+ 23.8	

The four-year trend in primary usage of general aviation aircraft by type of aircraft shows a healthy increase in turboprop and turbojet inventory which are the mainstays of the business executive fleet. Helicopter activity showed a strong increase in the same period, far above the 17.7 percent growth for all aircraft for the period.



	Personal	Aerial Application	Instructional	Air Taxi	Industrial	Rental	Other
	89,847	6,335	13,438	2,770	1,388	7,419	4,687
	75,162	6,571	11,702	1,880	1,442	6,283	1,663
	+ 19.5	-3.6	+ 14.8	+ 47.3	-3.8	+ 18.0	+ 81.8
	2,908	281	533	3,314	242	348	700
	2,961	354	595	2,230	303	434	545
	-1.8	-20.6	-10.4	+ 48.6	-20.1	-19.8	+ 28.4
	37	8	0	444	9	10	119
	25	1	0	235	3	3	31
	+ 48.0	—	—	+ 88.9	—	—	—
	19	4	22	170	8	25	199
	31	0	0	50	3	1	35
	-38.7	—	—	+ 340	—	—	—
	92,814	6,630	13,995	6,701	1,649	7,803	5,706
	78,179	6,926	12,297	4,395	1,751	6,721	2,274
	+ 18.7	-4.3	+ 13.8	+ 52.5	-5.8	+ 16.1	+ 250.9
	512	785	269	1,215	402	130	869
	256	555	197	689	633	45	189
	+ 200	+ 41.4	+ 50.2	+ 76	-36.5	+ 289	+ 462
	2,881	1	476	19	7	255	173
	6,581	110	469	130	119	349	1,179
	-56.2	—	+ 1.5	-85.4	-94.1	-26.9	-84.9
	96,209	7,418	14,742	7,936	2,059	8,189	6,749
	85,016	7,591	12,963	5,214	2,503	7,115	3,612
	+ 13.2	-2.3	+ 13.7	+ 52.2	-17.7	+ 15.1	+ 86.8





General aviation summary statistics for 1978 showed an increase over 1977 of 10.1 percent in flying hours, 7.9 percent in the number of active aircraft and a 1.8 percent increase in mean flying hours. Active aircraft comprised 85 percent of the entire general aviation registry.

Avionics Equipment by Primary Use — 1978

Primary Use	VHF Communications				Transponder Equipment			ILS Receiving Equipment			
	360 Ch	720 Ch	2+ Sys	No Comm	4096 Code	Alt Enc	No Trans	LOC	Mker Bec	Glide Slope	MLS
Executive											
Inventory	3211	9510	10037	535	11992	9712	848	11468	10745	10482	262
% of Use	25.4	75.1	79.3	4.2	94.7	76.7	6.7	90.5	84.8	82.8	2.1
Business											
Inventory	25891	18564	29902	2094	36047	18355	7506	32405	31179	26403	117
% of Use	60.5	43.4	69.9	4.9	84.2	42.9	17.5	75.7	72.8	61.7	0.3
Personal											
Inventory	69399	18651	40107	14241	48399	13796	50404	42318	36804	24937	34
% of Use	72.1	19.4	41.7	14.8	50.3	14.3	52.4	44.0	38.3	25.9	0.0
Aerial Application											
Inventory	1385	276	298	6035	385	150	7264	317	193	174	0
% of Use	18.7	3.7	4.0	81.4	5.2	2.0	97.9	4.3	2.6	2.4	0.0
Instructional											
Inventory	9502	5060	3206	671	6150	1199	8830	7493	3562	4387	2
% of Use	64.5	34.3	21.8	4.6	41.7	8.1	59.9	50.8	24.2	29.8	0.0
Air Taxi											
Inventory	3279	5048	5463	68	6523	3909	1575	6759	6107	5875	81
% of Use	41.3	63.6	68.8	0.9	82.2	49.3	19.9	85.2	77.0	74.0	1.0
Industrial											
Inventory	1143	893	552	104	1486	584	636	1281	1090	455	0
% of Use	55.5	43.4	26.8	5.1	72.2	28.4	30.9	62.2	53.0	22.1	0.0
Rental											
Inventory	4625	3673	3874	226	6537	1816	1793	5347	4855	3906	0
% of Use	56.5	44.9	47.3	2.8	79.8	22.2	21.9	65.3	59.3	47.7	0.0
Other											
Inventory	2748	2614	1693	873	3538	1813	2613	2855	2565	2219	9
% of Use	40.7	38.7	25.1	12.9	52.4	26.9	38.7	42.3	38.0	32.9	0.1
Inactive											
Inventory	9264	2233	3453	19345	3966	1239	26544	4098	3006	2233	66
% of Use	26.3	6.4	9.8	55.0	11.3	3.5	75.5	11.7	8.5	6.4	0.2
Total											
Inventory	**130367**	**66858**	**98688**	**45787**	**124603**	**52225**	**109344**	**113395**	**99484**	**81113**	**464**
% of Use	**55.7**	**28.6**	**42.2**	**19.6**	**53.3**	**22.3**	**46.7**	**48.5**	**42.5**	**34.7**	**0.2**

Business/executive aircraft and air taxis were topmost in sophisticated avionics. Some corporate aircraft are better equipped than air carrier aircraft.

Most aircraft that fly IFR (instrument flight rules) also have a transponder. Even though only 3.2 percent of light, single-engine aircraft (1-3 seats) have IFR equipment, 64.7 percent of these have a transponder.

IFR Flown and Transponder Equipped Aircraft in 1978

IFR Flown with Transponder

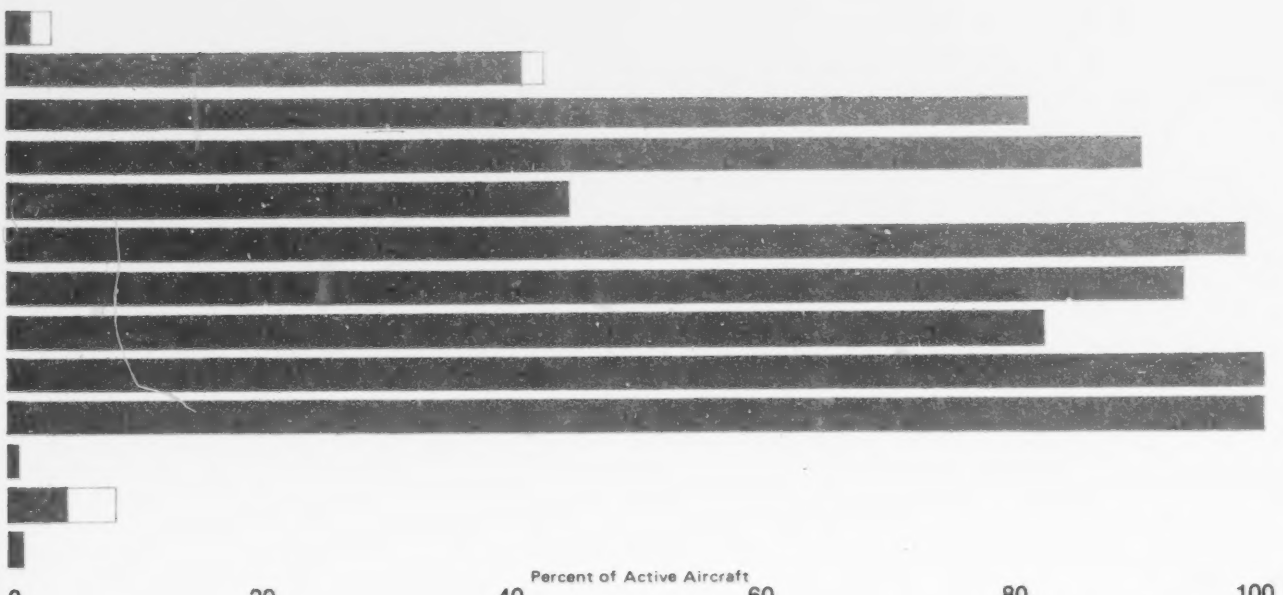
IFR Flown without Transponder

Aircraft Type

Fixed wing piston; 1 engine, 1-3 seats
Fixed wing piston; 1 engine, 4+ seats
Fixed wing piston; 2 engines, 1-6 seats
Fixed wing piston; 2 engines, 7+ seats
Fixed wing piston; other
Fixed wing turboprop; 2 engines, 1-12 seats
Fixed wing turboprop; 2 engines, 13+ seats
Fixed wing turboprop; other
Fixed wing turbojet; 2 engines
Fixed wing turbojet; other
Rotorcraft piston
Rotorcraft turbine
Other aircraft

Navigation Equipment

No ILS	VOR 100 Ch	VOR 200 Ch	2 + Rcvr	ADF	DME	RNav	LRNav	AutoPlt	RADAR Alt	Wthr RADAR	No NavEq
1332	2402	10691	11229	11228	10088	4444	1191	10284	5771	7052	296
10.5	19.0	84.4	88.7	88.7	79.7	35.1	9.4	81.2	45.6	55.7	2.3
9468	17115	25377	32906	33111	21579	5802	480	22549	2728	3871	1940
22.1	40.0	59.3	76.9	77.3	50.4	13.6	1.1	52.7	6.4	9.0	4.5
53077	50895	32584	41733	40605	16561	4131	234	17582	1258	553	16931
55.2	52.9	33.9	43.4	42.2	17.2	4.3	0.2	18.3	1.3	0.6	17.6
7325	406	273	284	411	133	38	2	64	0	57	6915
98.8	5.5	3.7	3.8	5.5	1.8	0.5	0.0	0.9	0.0	0.8	93.2
7157	7714	6261	3385	5513	1299	199	28	1316	1510	1489	1270
48.6	52.3	42.5	23.0	37.4	8.8	1.4	0.2	8.9	10.2	10.1	8.6
1335	2367	5328	5967	7113	4485	674	174	3844	551	1212	393
16.8	29.8	67.1	75.2	89.6	56.5	8.5	2.2	48.4	6.9	15.3	5.0
837	799	859	1141	983	578	44	29	604	120	20	443
40.7	38.8	41.8	55.4	47.8	28.1	2.2	1.4	29.4	5.9	1.0	21.5
2389	3194	4687	4606	4242	1566	305	37	2292	96	135	507
29.2	39.0	57.2	56.3	51.8	19.1	3.7	0.5	28.0	1.2	1.7	6.2
3282	1359	2843	2020	2248	1420	354	142	1236	412	462	2008
48.6	20.1	42.1	29.9	33.3	21.1	5.3	2.1	18.3	6.1	6.9	29.8
26154	6045	3680	3429	2906	1411	395	67	1457	485	382	20966
74.4	17.2	10.5	9.8	8.3	4.0	1.1	0.2	4.1	1.4	1.1	59.6
114623	**90408**	**93886**	**106705**	**107973**	**57906**	**16133**	**2292**	**62000**	**12790**	**15202**	**53157**
49.0	**38.6**	**40.1**	**45.6**	**46.2**	**24.8**	**6.9**	**1.0**	**26.5**	**5.5**	**6.5**	**22.7**



Retrospect and Forecast

Active aircraft and total flight time in general aviation grew at about the same rate for the five year period, 1973-1978, but some aircraft types grew significantly while others barely gained or actually lost. Turbine helicopters showed the biggest growth rate in both inventory and hours flown, reflecting the increased usage of rotary wing aircraft. In business aviation, helicopter growth was second only to light turboprop growth.

The FAA Annual Aviation Forecast for 1980 indicates that general aviation growth by units will increase around four or five percent until 1982 and then will taper off to an average of 3.5 percent until 1992. Single-engine aircraft show a trend downward while aircraft most popular with business flyers — the more sophisticated twin engine piston, turboprop and turbojet aircraft — are increasing, according to industry figures. These same industry figures indicate that the general aviation fleet consisted of 208,000 aircraft at the end of 1979. Of these, 6,400 were turboprop and turbojet aircraft. The turbine powered fleet grew 14.3 percent compared to 4.6 percent for the entire general aviation fleet.

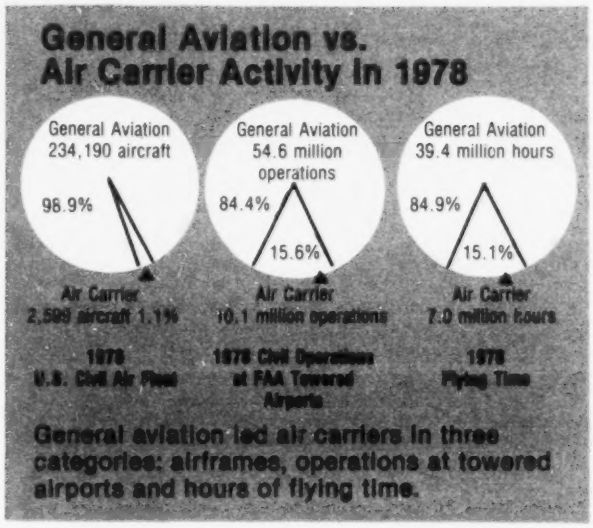
Five-Year Compound Annual Growth Rate (1973-1978)

(Percent per Year)

AIRCRAFT TYPE	AIRCRAFT	HOURS
FIXED WING		
1-engine; 1-3 seats	2.93	0.79
1-engine piston; 4 seats	6.27	8.09
2-engine piston; 1-6 seats	3.03	2.36
2-engine piston; 7+ seats	7.74	7.19
Other piston	3.07	4.36
2-engine turboprop; 1-12 seats	14.61	10.91
2-engine turboprop; 13+ seats	2.15	4.13
Other turboprop	-4.90	-8.29
2-engine turbojet	12.08	11.36
Other turbojet	14.62	14.61
ROTORCRAFT		
Piston	5.87	4.27
Turbine	20.20	22.51
OTHER	12.85	10.30
TOTAL AIRCRAFT	**5.33**	**5.63**

General Aviation Forecase

Aviation Activity	Forecast 1981	1982	1992	Percent Average Annual Growth 75/79	79/80	80/81	81/82	80/92
Fleet (thousands)	218.7	228.5	315.5	5.4	4.6	5.1	4.5	3.5
Hours Flown (millions)	43.9	46.1	64.3	6.5	2.4	4.3	5.0	3.6



The estimated fuel consumption of 518 million gallons of aviation gasoline and 763 million gallons of jet fuel for general aviation for 1978 was based on the mean rate of gallons per hour and the utilization of each type of aircraft. The NBAA Energy Committee predicts that the price of jet fuel will average $1.84 in 1981; $2.08 in 1982 and $2.30 in 1983.

Fuel Consumed — 1978

AIRCRAFT TYPE	MEAN RATE GPH	ESTIMATED FUEL USE (mil. gal.)
FIXED WING		
PISTON		
1-engine; 1-3 seats	8.18	82.74
1-engine; 4+ seats	11.03	195.81
TOTAL 1-ENGINE	10.00	278.55
2-engine; 1-6 seats	26.54	96.69
2-engine; 7+ seats	40.78	99.45
TOTAL 2-ENGINE	32.25	196.14
OTHER PISTON	287.61	29.77
TOTAL PISTON	**14.82**	**504.46**
TURBOPROP		
2-engine; 1-12 seats	75.84	72.79
2-engine; 13+ seats	178.77	111.22
TOTAL 2-ENGINE	116.32	184.01
OTHER TURBOPROP	252.13	6.15
TOTAL TURBOPROP	**118.38**	**190.15**
TURBOJET		
2-engine	302.32	307.97
OTHER	1216.19	213.47
TOTAL TURBOJET	**436.63**	**521.45**
TOTAL FIXED WING	**33.01**	**1216.07**
ROTORCRAFT		
Piston	**15.40**	**12.42**
Turbine	**36.12**	**51.34**
TOTAL ROTORCRAFT	**28.62**	**63.76**
OTHER	**3.21**	**1280.91**
TOTAL JET FUEL	**180.72**	**762.94**
TOTAL AVIATION GASOLINE	**14.72**	**517.97**

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business flying

1981 Section 1

NATIONAL
BUSINESS AIRCRAFT
ASSOCIATION, INC.

A LOOK AT ACCIDENT STATISTICS

Introduction

News about accidents is never pleasant. Even good news such as a reduction in the accident rate. Accident statistics are a reminder that accidents still, indeed, do happen and will happen until there is a string of "zeros" in the "total" columns. We can benefit by being reminded what others have done to make them a statistic. Accident statistic reporting is a "word to the wise." To be knowledgeable of accidents and their causes is the first step in avoiding that would-be next accident for the NBAA pilot or crew members.

This issue of **Business Flying** reports on accidents in corporate aviation in 1978. It analyzes causes and compares the accident statistics of aviation with the rest of general aviation.

Corporate aviation has the lowest accident rate of all general aviation. A careful look at the statistics for corporate and general aviation for one year — 1978 — may be a factor in making that record even better.

Statistics are compiled by the National Transportation Safety Board based on reports from the Federal Aviation Administration.

Definitions

Aircraft Accident

An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, and in which any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or in which the aircraft receives substantial damage.

Fatal Injury

Any injury which results in death within 7 days of the accident for 1978. In 1980 the number of days was changed from 7 to 30 to conform to ICAO data criteria.

Serious Injury

Any injury which 1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; 2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); 3) involves lacerations which cause severe hemorrhages, nerve, muscle, or tendon damage; 4) involves injury to any internal organ; or 5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

Substantial Damage

1) Substantial damage means damage or structural failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which normally require, major repair or replacement of the affected component. 2) Engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage."

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Distribution

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Corporate Flying is Safest

Corporate flyng is much safer than other types of general aviation and may be compared favorably with the airlines. Corporate planes look even better than air carrier aircraft if the figures are based not on the number of hours flown but on the number of takeoffs and landings the planes make.

It is in those two phases of flight that the overwhelming majority of accidents occur. The skills of pilots and the record of planes in safely negotiating takeoffs and landings is more meaningful than a record of merely accumulating routine hours in the air between departure and destination points.

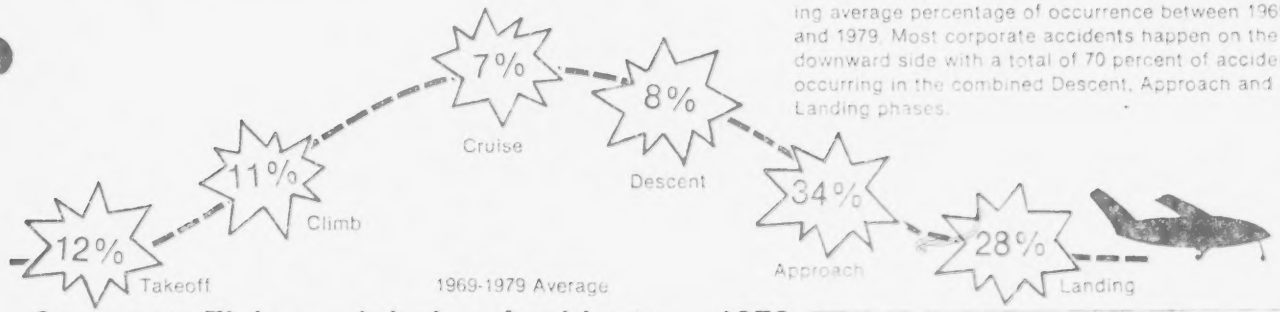
Corporate Accidents, 1975-1979

Year	Corporate Hours Flown (000)	Total Accidents	Total Accident Rate*	Fatal Accidents	Fatal Accident Rate*	Fatalities	All General Aviation Fatal Accident Rate*	All General Aviation Total Accident Rate*
1975	3,806	63	1.65	17	0.44	44	12.3	2.0
1976	3,982	57	1.43	14	0.35	42	12.0	1.9
1977	4,246	60	1.41	18	0.42	51	12.6	2.1
1978	4,681	87	1.78	23	0.47	65	11.4	2.0
1979	4,595	76	1.65	13	0.28	47	9.3	1.6

* Rate per 100,000 hours

Where Corporate Accidents Happen

In a special study of corporate aircraft accidents, Robert Breiling, of International Learning Systems, traced the pattern of accidents and found the following average percentage of occurrence between 1969 and 1979. Most corporate accidents happen on the downward side with a total of 70 percent of accidents occurring in the combined Descent, Approach and Landing phases.



Corporate Flying — Injuries, Accidents — 1978

87 Total Accidents • 23 Fatal Accidents

	Fatal	Serious	Minor	None	Total Aboard
Pilot	21	5	8	53	87
Copilot	9	1	1	18	29
Flight Engineer				1	1
Extra Crew				1	1
Passengers	32	9	9	141	191
Total	62	15	18	214	309
Other Aircraft*		1			1
Other Ground	3	1		1	5
Grand Total	65	17	18	215	315

*Injuries carried opposite "Other Aircraft" are injuries in aircraft not part of this tabulation, but were part of total injuries involved in collisions between aircraft.

Corporate injury statistics closely follow figures for all of general aviation for 1978. For example, corporate pilot fatalities were 32 percent while pilot fatalities in all general aviation were 40.1 percent. Passengers in corporate plane accidents represented 49 percent of all corporate fatalities, while in all of general aviation, passengers represented 44.7 percent of all fatalities. Pilot and passenger figures are on the high side for both corporate and all of general aviation because there is always a pilot on board and very often there is more than one passenger. Some of the other positions are not always occupied.

Causes and Related Factors

In determining probable cause of an accident, all facts, conditions, and circumstances are considered. The object is to ascertain those cause-effect relationships in the accident sequence about which something can be done to prevent recurrence of the type of accident under consideration. Where two or more causes exist in an accident, each is recorded and no attempt is made to establish a primary cause. The figures shown in the columns dealing with Cause exceeds the total number of accidents. The term Factor is used, in general, to denote those elements of an accident which futher explain or supplement the probable cause.

Broad Cause/Factor Table — Corporate Accidents

(Excludes Accidents Without Causal Assignment) 87 Total Accidents • 23 Fatal Accidents

	Fatal Accidents			Non-Fatal Accidents			All Accidents		
Broad Cause/Factor	Cause	Factor	Total*	Cause	Factor	Total*	Cause	Factor	Total*
Pilot *Number*	15	5	17	44	4	44	59	9	61
Percent	65.22	21.74	73.91	68.75	6.25	68.75	67.82	10.34	70.11
Personnel	4	1	4	9	3	12	13	4	16
	17.39	4.35	17.39	14.06	4.69	18.75	14.94	4.60	18.39
Airframe		2	2	1		1	1	2	3
	.00	8.70	8.70	1.56	.00	1.56	1.15	2.30	3.45
Landing Gear				5	1	5	5	1	5
	.00	.00	.00	7.81	1.56	7.81	5.75	1.15	5.75
Powerplant	6	2	7	12		12	18	2	19
	26.09	8.70	30.43	18.75	.00	18.75	20.69	2.30	21.84
Systems		1	1	2		2	2	1	3
	.00	4.35	4.35	3.13	.00	3.13	2.30	1.15	3.45
Rotorcraft	1		1				1		1
	4.35	.00	4.35	.00	.00	.00	1.15	.00	1.15
Airport/Airways/Facilities				2	8	10	2	8	10
	.00	.00	.00	3.13	12.50	15.63	2.30	9.20	11.69
Weather		11	11	1	9	9	1	20	20
	.00	47.83	47.83	1.56	14.06	14.06	1.15	22.99	22.99
Terrain		4	4		6	6		10	10
	.00	17.39	17.39	.00	9.38	9.38	.00	11.49	11.49
Miscellaneous	1		1	3		3	4		4
	4.35	.00	4.35	4.69	.00	4.69	4.60	.00	4.60
Undetermined	3		3				3		3
	13.04	.00	13.04	.00	.00	.00	3.45	.00	3.45

The figures opposite each causal category represent the number and percent of accidents in which that particular causal category was assigned.

*If an accident includes both a cause and related factor in the same causal category, the accident is represented once: the total for that category.

Reasons Why

Pilot. Cause/Factors include some 38 categories, the most common of which are Failed to Follow Approved Procedures and Directives (6), Failure to Obtain or Maintain Flying Speed (6) and Inadequate Preflight Preparation and Planning (9).

Failed to Follow Approved Procedures and Directives was listed as Cause for two fatal corporate accidents and was a Factor in two fatal accidents. The same category was listed as a Cause in two non-fatal accidents. Failure to Maintain or Obtain Flying Speed caused three fatal accidents and three non-fatal accidents. Inadequate Preflight and Planning was a Cause of one fatal accident and a Factor in three. It was also listed as the Cause of five non-fatal accidents and a Factor in three.

Other frequent detailed Cause/Factors involving pilots were Improper IFR Operation, Selected Unsuitable Terrain and Misjudged Distance and Altitude. All of these were a Cause or a Factor in five accidents — fatal and non-fatal.

Personnel. In this case, "personnel" refers to those other than the pilot. They include maintenance and servicing people and traffic controllers. The most common accident Cause/Factor in this category was Improper Maintenance with four accidents — two of which were fatal. This category was followed by Inadequate Maintenance and Inspection with three, none of which were fatal.

Airframe. The Landing Gear and its Retraction and Extension Assembly were cited in three cases, as Cause/Factors. None were fatal. Flight Control surfaces were contributing factors in three fatal accidents — Horizontal Stablizer (2) and Elevator Assembly (1).

Powerplant. Powerplant Failure for Undetermined Reasons was listed as the most frequent Cause/Factor with five. Three of these were in the "fatal" column.

Systems. The Electrical System and the Hydraulic System were each cited as a cause of a non-fatal accident. The Elevator and Elevator Tab Control system was blamed as a factor in one fatal accident.

No News is Good News

Since there are, thankfully, so few corporate accidents, many types of accidents officially listed by the National Transportation Safety Board are not included simply because there were no accidents in these categories to record. No corporate pilot hit a runway light or approach light, auto or animal. No one overshot a landing. There was no spiral, no propeller failure. There were no accidents relative to jet intakes or exhausts. The chart suggests that, although the figures are sparse, the wary pilot, seeking safety perfection, can still learn something from these figures.

Corporate Accident by Pilot Certificate and Aircraft Damage

	Pilot Certificate				Aircraft Damage			Totals	
Type of Accident	Commercial	ATR	Commercial/ Fl. instr.	ATR/ Fl. Instr.	Destroyed	Substantial	Minor	Accidents	Percent
Ground-Water Loop Swerve	6	2	1	2		11		11	12.64
Wheels Up Landing	2	2		1		5		5	5.75
Gear Collapsed		1				1		1	1.15
Gear Retracted			2	1		3		3	3.45
Hard Landing	3	1		1	1	4		5	5.75
Nose Over/Down			1			1		1	1.15
Roll Over	1		1			2		2	2.30
Undershoot	2	1	1	1	1	4		5	5.75
Collison Between Aircraft									
One Airborne		1				1		1	1.15
Collision with Ground/Water									
Controlled	3		2		4	1		5	5.75
Uncontrolled	1			1		2		2	2.30
Collided With									
Wires/Poles	2				1	1		2	2.30
Trees	1		1		2			2	2.30
Building(s)		1				1		1	1.15
Fence, Fence-posts	2				1	1		2	2.30
Electronic Towers			1		1			1	1.15
Airport Hazard	2					2		2	2.30
Parked Aircraft (Unattended)				1		1		1	1.15
Other				1		1		1	1.15
Stall									
Spin		1	1		1	1		2	2.30
Mush		1		1		2		2	2.30
Fire or Explosion									
In Flight	1	2		1	2	2		4	4.60
Airframe Failure									
In Flight	2	1			2	1		1	3.45
Engine Failure or Malfunction	6	7	4	2	11	8		19	21.84
Propeller/Rotor Failure									
Main Rotor		1				1		1	1.15
Rotor Accident to Person	1			1			2	2	2.30
Miscellaneous/Other		1				1		1	1.15
Accidents	35	23	15	14	29	56	2		
Percents	40.2	26.4	17.2	16.1	33.3	64.4	2.3		

Rotorcraft. There were two corporate accidents involving Rotorcraft, one fatal and one non-fatal. The Engine Drive Shaft was responsible for both the fatal and non-fatal accident.

Airports, Airway Facilities. No fatal accidents were attributed to this category for corporate aircraft accidents in 1978. A wet runway was cited as a Cause in two non-fatal accidents. Airways facilities were not guilty of an accident Cause or Factor.

Weather. Next to the "Pilot" category, "Weather" is the most frequent Cause/Factor in corporate aviation accidents. The leading detailed "Weather" Cause/Factor was low ceiling with eleven, nine fatal and two non-fatal accidents. "Fog" was the second most frequent Cause/Factor with seven. "Fog" was the Factor in five fatal and two non-fatal accidents. Icing Conditions were cited "factors" in two fatal accidents. "Snow" was a Factor in one fatal and three non-fatal accidents while thunderstorm activity was a Factor in one fatal and one non-fatal accident.

Terrain. "High Obstructions" were the most frequent factors in accidents involving terrain. Three fatal and non-fatal corporate accident, were attributed to high obstructions. Rough/uneven terrain was the second most frequent factor with one fatal and two non-fatal accidents attributed to this category.

Miscellaneous. Foreign Object Damage was the culprit with the largest Cause, but there were only two, both non-fatal.

Other Miscellaneous, Acts and Conditions. In this category, Material Failure was cited nine times as a corporate accident Cause, two fatal, seven non-fatal. Overload Failure was cited as a factor in two fatal and six non-fatal corporate accidents. Improper Emergency procedures caused two fatal accidents and was a Factor in another fatal accident. The same category was cited as a Cause for one non-fatal accident.

Instruments, Equipment and Accessories, had a clean record in 1978. No causes or factors in fatal or non-fatal corporate accidents.

General Aviation Accidents — 1978

Includes Personal, Instructional, Air Taxi, Aerial Application, Industrial, Rental and Business as well as Corporate.

Most Frequent Cause/Factor

Because there are relatively few corporate accidents there is not always sufficient data to show trends in types and causes of accidents from corporate accidents, alone.

The 1978 figures for all general aviation, of which corporate aviation is a part, have a much larger data base. Accident causes can be tallied and trends predicted. Results may be interpreted for future corporate safety program plans.

From these wider-based figures a Cause/Factor determination was made on 4,424 of the 4,494 U.S. general aviation accidents occurring in 1978. As in the past, weather and the pilot continue to be involved, significantly in the vast majority of accidents.

The predominant causal factor for non-fatal accidents was Pilot — Inadequate Preflight Preparation or Planning. There were 420 accidents (11.47%) in this one category. Pilots were also cited in six out of the 10 leading cause/factors of non-fatal accidents.

The most frequent causal factor involved in fatal accidents was Weather — Low Ceiling. This one cause was recorded in 182 (23.92%) accident cause/factor determinations which involved 409 (23.10%) of U.S. general aviation fatalities.

Following this cause was Pilot — Continued VFR Flight Into Adverse Weather Conditions, accounting for 150 (19.71%) fatal accidents. Pilot — Failed to Obtain/Maintain Flying Speed was the third leading cause/factor, encompassing 148 (19.45%) fatal accidents. As in the non-fatal accident category, pilots were cited in six out of the 10 leading fatal accident cause/factor determinations.

In summary, the pilot was a Casual/Factor in 644 of the 761 fatal accidents with Cause/Factor determination (84.63%), and 2,916 of the 3,663 non-fatal accidents with cause/factor assignment (79.16%). Weather was cited as a Cause/Factor in 310 fatal accidents (40.74%), and in 599 non-fatal accidents (16.35%).

Types of Accidents

Little change occurred in the types of accidents prevalent in 1978 and in previous years. Engine Failure or Malfunction continues to be the leading first accident type in general aviation, accounting for 23.91% or 1,089 of the total accidents recorded. The most common accidents that follow Engine Failure Malfunction are: Collision with Trees (196), Nose Over Down (140), Collision with Ground/Water-Controlled (113), Hard Landing (106), and Gear Collapsed (88).

Ground/Water Loop-Swerve is the second most common first accident type with 568 accidents or 12.47% of the total 1978 accidents. In 1977 these figures were 501 and 11.55%, respectively. Accidents following Ground/Water Loop-Serve are: Nose Over/Down (110), Gear Collapsed (101), Collided with Snowbank (75), Collided with Ditches (46), and Collided with Trees (19).

Hard Landing is the third highest first accident type, consisting of 283 accidents (6.21%) in 1978 as compared with 251 accidents (5.79%) in 1977. Most common second accident types following Hard Landing are Gear Collapsed (119) and Nose Over/Down (26).

The five leading first accident types — Engine Failure/Malfunction, Ground Water Loop-Swerve, Hard Landing, Collision with Ground/Water-Controlled and Collision with Trees — account for over half (52.65%) of the total accidents but only 15% of the fatal accidents.

However, the five leading fatal accident types — Collision with Ground/Water-Controlled, Collision with Ground/Water-Uncontrolled, Engine Failure/Malfunction, Collision with Trees and Stall/Spin — account for well over half (59.08%) of the fatal accidents but less than half (38.80%) of the total accidents. Three first accident types — Engine Failure/Malfunction, Collision, with Ground/Water-Controlled and Collison with Trees — appear in the top five first accident types for both total and fatal accidents.

Those first accident types having the highest percentage of fatal accidednts to total accidents are: Collision with Ground/Water-Uncontrolled (83%), Spiral (70%), and Spin (68%). These three first accident types, closely related in nature, account for over 24% of all fatal accidents.

Phases of Operations

Most of the total accidents recorded in 1978 occurred during landing, while the majority of fatal accidents occurred during the inflight phase of operation. There were 1,880 total accidents (41.28%) that occurred during the landing phase and included Ground/Water Loop-Swerve, Hard Landing, Overshoot, Undershoot and Nose Over/Down as the most common accident types. Inflight phases of operation had the second highest number of accidents, 1,528, representing 33.55% of the total. Engine Failure or Malfunction led all other accidents in this phase of operation. Accidents occurring during takeoff numbered 889, or 19.52%.

Fatal accidents occurred more often during the inflight phase of operations, accounting for 520 accidents, or 63.73% of all fatal accidents. Fatal landing and takeoff accidents number 143 (17.52%) and 107 (13.11%), respectively. Most of the inflight fatal accidents occurred during Normal Cruise, Uncontrolled Descent, and Initial Climb, in that order.

Ten Most Frequently Cited Cause/ Factor of 3,663 Non-fatal Accidents

Cause/Factors	Frequency	Percent
Pilot — Inadequate Preflight Preparation or Planning	420	11.47
Miscellaneous Acts, Conditions Overload Failure	384	10.48
Terrain — High Obstructions	296	.08
Weather — Unfavorable Wind Conditions	288	7.86
Pilot — Mismanagement of Fuel	274	7.48
Pilot — Failed to Obtain/Maintain Flying Speed	272	7.43
Pilot — Improper Level Off	265	7.23
Pilot — Failed to Maintain Directional Control	258	7.04
Micellaneous Acts, Conditions Material Failure	241	6.58
Pilot — Selected Unsuitable Terrain	227	6.20

Ten Most Frequently Cited Cause/ Factors of 761 Fatal Accidents

Cause/Factors	Frequency	Percent
Weather — Low Ceiling	182	23.92
Pilot — Continued VFR Flight Into Adverse Weather Conditions	150	19.71
Pilot — Failed to Obtain/Maintain Flying Speed	148	19.45
Weather — Fog	112	14.72
Pilot — Spatial Disorientation	88	11.56
Pilot — Inadequate Preflight Preparation or Planning	84	11.04
Terrain — High Obstructions	83	10.91
Pilot — Improper Inflight Decisions or Planning	74	9.72
Weather — Rain	71	9.33
Miscellaneous — Unwarranted Low Flying	70	9.20

Ten Most Frequent Types of Accidents

Type of Accident	Frequency	% of total accident records
Engine failure or malfunction	1089	23.91
Ground/water loop-swerve	568	12.47
Hard landing	283	6.21
Collision with ground/water controlled	259	5.69
Collided with trees	199	4.37
Overshoot	189	4.15
Collided with wires/poles	177	3.89
Stall/mush	173	3.80
Nose over/down	164	3.60
Collision ground/water uncontrolled	142	3.12

Ten Most Frequent Types of Fatal Accidents

Type of Accident	Frequency	% of total accident records
Collision with ground/water controlled	132	16.18
Collision with ground/water uncontrolled	118	14.46
Engine failure/malfunction	108	13.24
Collision with trees	71	8.70
Stall/Spin	53	6.50
Airframe failure in flight	52	6.37
Stall	46	5.64
Midair collisions	45*	5.51
Collided with wires/poles	42	5.15
Stall/Mush	13	1.59

* Includes both aircraft records

Total Accident by Phase of Operation

Phase of Operation	Accident Records	% of Total Records
Landing	1880	41.28
Inflight	1528	33.55
Takeoff	889	19.52
Taxi	175	3.84
Static	37	0.81

Fatal Accidents by Phase of Operation

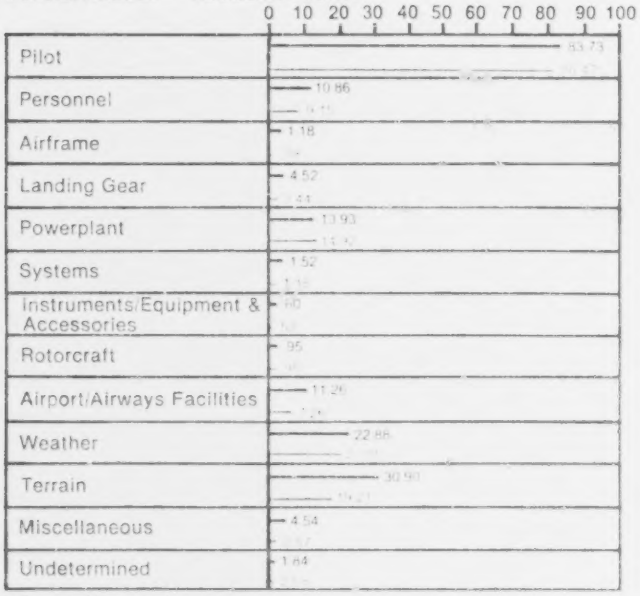
Phase of Operation	Accident Records	% of Fatal Records
Inflight	520	63.73
Landing	143	17.52
Takeoff	107	13.11
Static	5	0.61
Taxi	3	0.37

General Aviation—5-Year Average vs. 1978

(1978 in green)

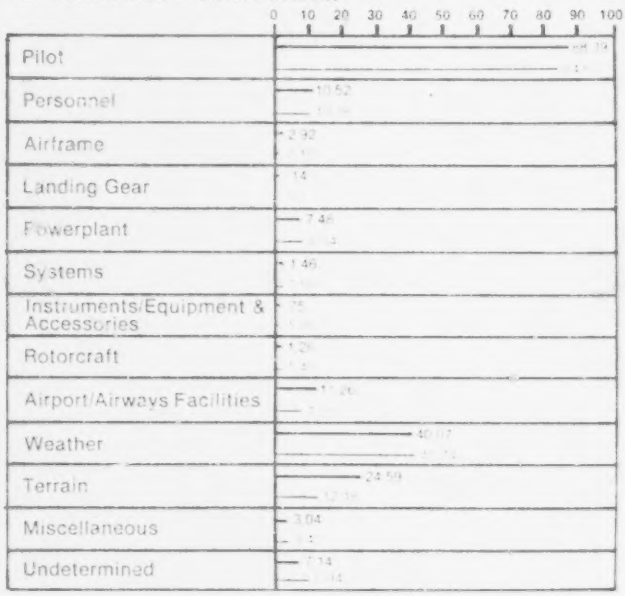
Total Accidents

General Aviation — Accidents Factors



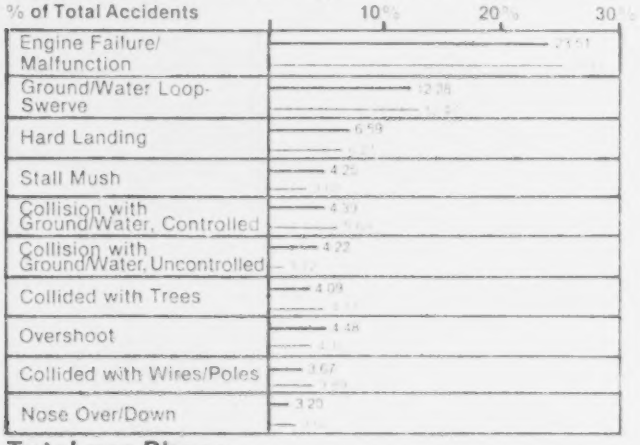
Fatal Accidents

General Aviation — Fatal Accident



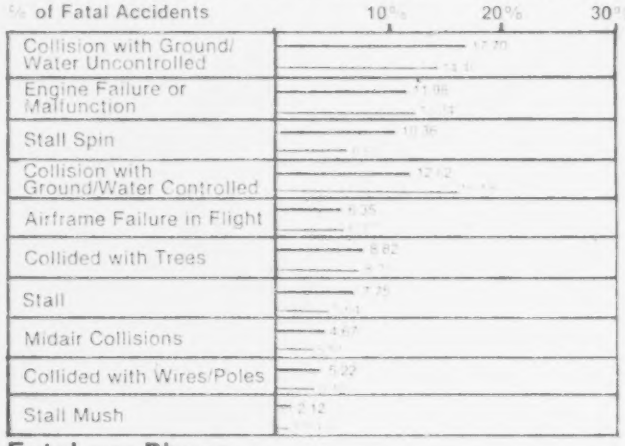
Most Prevalent

General Aviation — Ten Most Frequent Accident Types



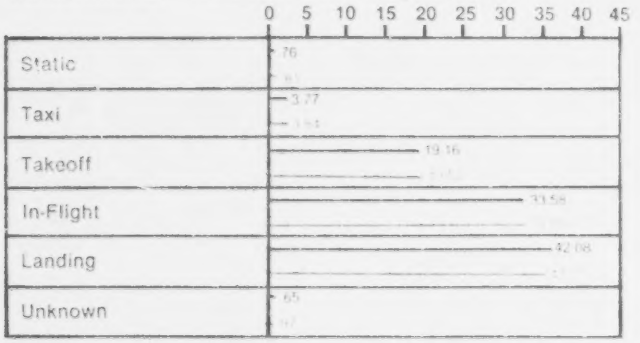
Most Prevalent Fatal

General Aviation — Ten Most Prevalent Fatal Accident Types



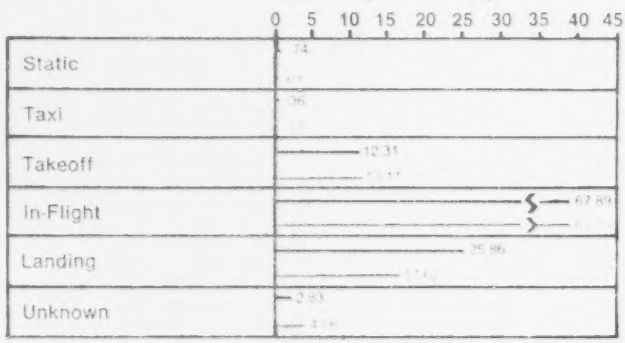
Total per Phase

General Aviation — Accidents Phase of Operation



Fatal per Phase

General Aviation — Fatal Accidents by Phase of Operation



The accident pattern for general aviation in 1978 was very close to the five year average in each case — Cause/Factors, Most Prevalent types and Phases of Operation.

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• business flying

1981 — Section 2

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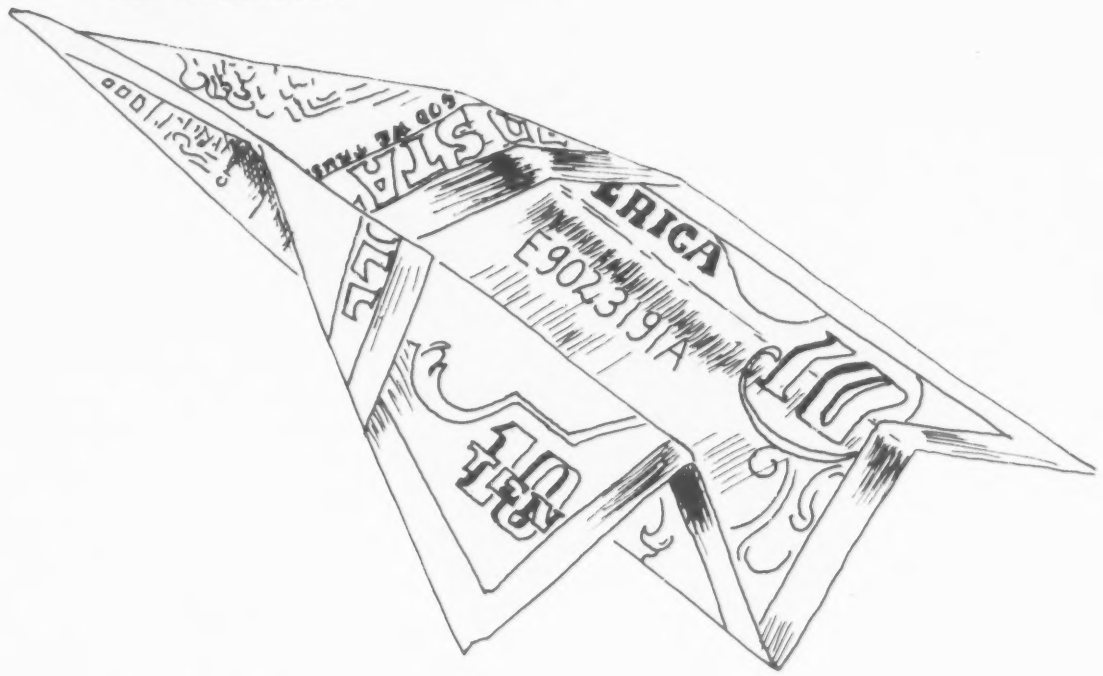

BUSINESS AVIATION AND THE FORTUNE 1,000 • INDUSTRIALS

More Leading Industrials Adopt the Company Airplane

Introduction

The 1000 largest industrials are identified by *Fortune* magazine, and the economic performance is reported in the May and June issues of the magazine each year. Information on companies operating business aircraft and the specifications associated with these companies are an outgrowth of a study done annually by Aviation Data Service (ADS), Wichita, Kansas.

Summary

The majority of the leading industrial companies of the United States operate business aircraft. Of the 1000 largest publicly held corporations in the United States, 524 operate one or more business aircraft. Value of the fleet now totals $1.76 billion.

The company airplane is measured by the same performance standards as any piece of capital equipment owned and/or operated by the industrials. During the 1979 year, the number of companies operating business aircraft grew from 522 to 524. At the beginning of 1980, companies operating aircraft had a total of 1842 aircraft, up from 1768 a year earlier.

An examination of the transactions during the twelve months up to January 1980 reveals sale of 203 aircraft with a value of $98 million. During the same time frame, 281 aircraft were purchased by the leading industrials, and they had a value of $326 million.

On the financial side, the 524 *Fortune 1000* corporations that operated aircraft during 1979 accounted for 87 percent of the sales, 87 percent of the net income, 87 percent of the assets and 83 percent of the total employees. They represented an aircraft fleet at year-end of 1842 units, ranging in size from a J3 Piper Cub up to and including a Boeing 727 Intercontinental. Value of the fleet increased 17 percent during the year, topping the $1.76 billion mark. The number of units in the fleet rose from 1768 to 1842 at the close of 1979.

The majority of super corporations operating aircraft — 69 percent in 1979 — continue to be found among the top 500 industrials. The trend, however, is for a greater increase of aircraft-operators among those below the 500 level. Since Aviation Data Service, Inc. (ADS) began compiling these statistics in 1969, there has been a 36 percent increase in aircraft operators among the second 500 companies compared to a 22 percent increase among the top 500.

In comparing 1979 against 1978, there was a 2.6 percent increase in operators among the top 500, but a 4.1 drop among those below the 500 level.

Not surprising, however, 84 percent of the *Fortune 1000* fleet is operated by the top 500 and 41 percent by the top 100 companies alone, based on net sales. Interestingly, only four companies in the top 100 did not operate aircraft during 1979.

There were 41 newcomers to the *Fortune* listing during 1979 and they brought 76 aircraft into the compilation. In addition, existing *Fortune 1000* companies acquired 281 new or used aircraft during the year and 22 *Fortune* Companies, not previously known as aircraft operators, accounted for 28 aircraft. On the other hand, 13 companies with 20 aircraft dropped out of the top 1000. There were ten companies that sold their aircraft during the year and are no longer operators; 203 aircraft flown by existing operators were either lost from service or sold. Thirteen companies were absorbed into larger corporations, causing a net loss of eleven operating companies.

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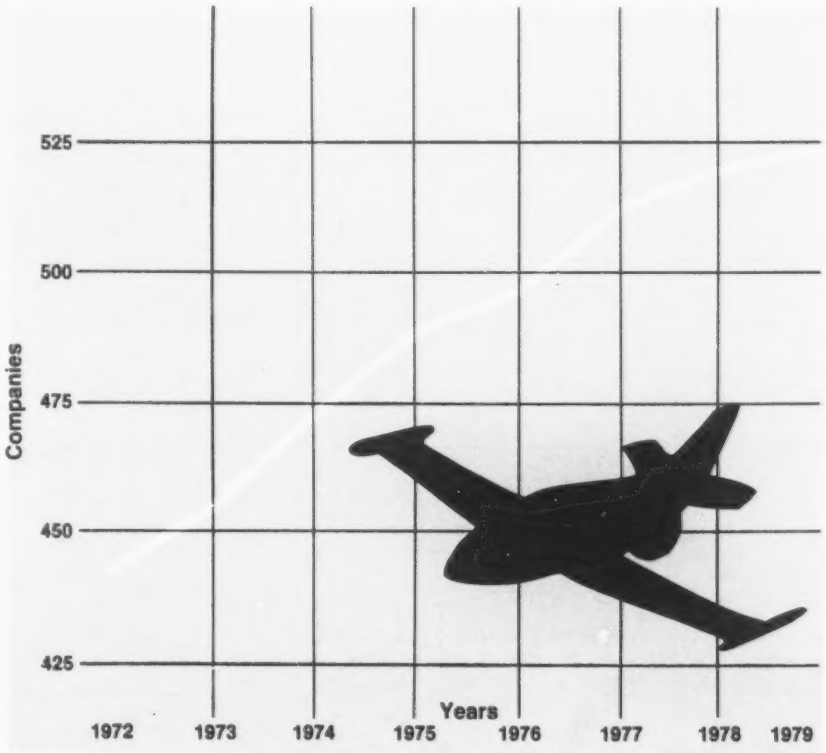
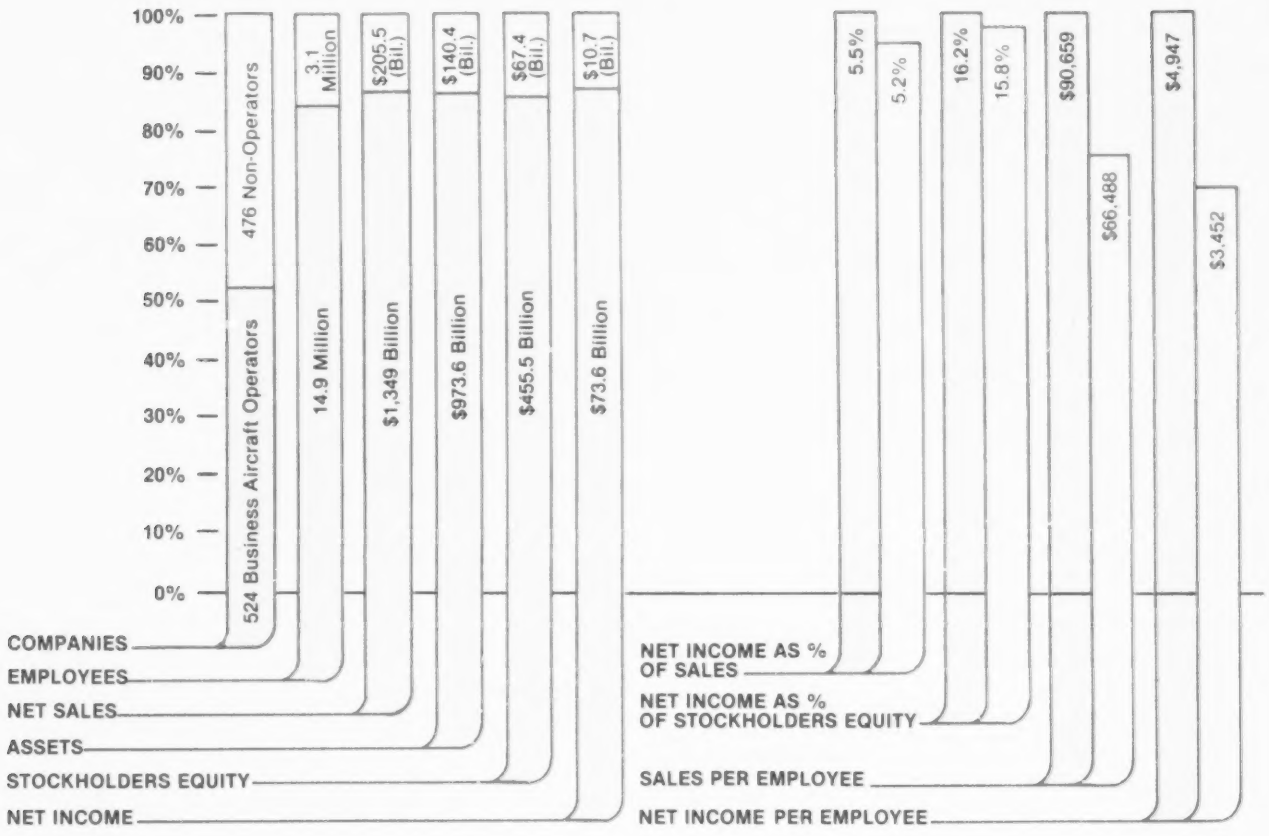




Business Results Differ Sharply

Value of a corporate aircraft can be a very controversial subject. Is it simply a perquisite for the boss or a viable business tool? There are good examples of both, as the IRS and the SEC are learning.

But among the top 1000 industrials, the differences in the business results between aircraft operators and non-operators is staggering.

Keeping in mind that there are roughly the same number of operators as there are non-operators — 524 versus 476 — net sales by aircraft-operating companies of $1.350 trillion was over six and one-half times that of non-operating *Fortune* companies. Corporate assets for those same 524 aircraft operators were $973.0 billion, or almost seven times those of non-operators; net income of $73.6 billion was almost seven times greater; stockholders' equity of $455.5 billion was over six and one-half times greater; and the 14.9 million employees of operating companies was almost five times greater than the employment of non-operating companies.

Net income as a percentage of sales averaged 5.5 percent for the top 1000 industrials operating aircraft as opposed to 5.2 percent for non-operating companies.

It is interesting to note here that the highest level of net income as a percentage of sales (8.7 percent) was achieved by those operating companies ranking 601 to 700 and 6.8 percent by those companies ranking 801 to 900, yet third was taken by non-operating companies ranking 1 to 100 at an unusually high percentage of 6.3.

Indeed, our data shows that there are only 67 operators in those categories — versus 133 non-operators — with a fleet of 95 aircraft. Yet, of the 96 operators in the top 100, the four non-operators had net income percentages to sales rivaling last year's top, 6.3.

There is no red flag that jumps out as a reason for such a performance by the companies in those two categories in terms of aircraft fleet. The group operates 1.42 aircraft per flight department compared to 8.24 for the top 100 companies and 1.36 for the bottom 100. The fleet of 95 aircraft breaks down as one single engine, 17 piston twins, 41 turboprops, 32 jets and four helicopters.

In terms of sales per employee, the 524 companies that operate aircraft bettered the non-operating companies by 36 percent, and in terms of assets per employee, by 44 percent. Net income per employee for those companies operating aircraft was a substantial 43 percent higher than those companies tied to ground transportation and/or the commercial airlines.

Who Operates Business Aircraft?

There is no specific pattern to business aircraft users among the 28 categories of Standard Industrial Classification (SIC). Certainly, as in the past, the standouts are food processors, petroleum refiners and manufacturers of industrial and farm equipment. For instance, industrial and farm equipment represents the greatest number of *Fortune 1000* aircraft operators at 60; 61 percent of all companies in that category. Second among operators are food processors, numbering 50. The top percentage among groups is aerospace with 87 percent of the companies operating aircraft.

Of all *Fortune 1000* companies 9.5 percent are in food processing. They represent 9.5 percent of the 524 aircraft operators, but only 6.1 percent of the fleet. Petroleum refiners, on the other hand, represent only 4.8 percent of the 1000 companies, 6.7 percent of those that operate aircraft, and a whopping 16.4 percent of the *Fortune* aircraft fleet. Dropping down to manufacturers of industrial and farm equipment, that category represents the greatest number of operators at 11.5 percent, while accounting for 8.8 percent of the *Fortune* fleet.

As a matter of fact, 192 of the 524 operating companies, or nearly 37 percent, operate only one aircraft. Eight companies operate 19 or more aircraft with the largest fleet being 37.

In terms of sales, the leading SIC category among non-operators is food processing with $24.0 million in 1979. But they were soundly outdistanced by those *Fortune 1000* food processors that do not operate aircraft, logging $100.3 million. As might be expected, the leader in sales was petroleum refiners with $385.5 million total, of which aircraft operators captured $372.8 million, or 97 percent of the total. This same pattern holds true in terms of corporate assets, net income and stockholders equity.

Fortune 1000 companies operating aircraft completely outpaced non-operating companies in total employment during 1979 — 14.9 million versus 3.1 million, or 82.8 percent of the total 18 million workers.

This statistic becomes even more explicit, however, when you stop to examine the difference between sales per employee among aircraft operators and non-operators. In other words, productivity per employee. In 12 SIC industrial categories, employees of non-aircraft operators produced more than their brethren working for companies with aircraft. Yet, the statistics show that the average sales per employee for the aircraft operating companies were $90,659, or 36 percent better than companies without aircraft. Incidentally, employees of companies in the category of mining and crude oil production that operate aircraft outperformed their colleagues in non-operating companies by 107 percent.

In terms of net income per employee for all the 1000 industrials, the difference is even more dramatic. Employees of aircraft operators averaged $4,947 each in net income to their companies, 43 percent better than employees of the non-operating companies. In petroleum refining alone, the spread was 156 percent — $20,992 per employee versus $8,187.

Standard Industrial Classification Group
10—Mining, Crude Oil Production
20—Food
21—Tobacco
22—Textiles, Vinyl Flooring
23—Apparel
25—Furniture
26—Paper, Fiber and Wood Products
27—Publishing, Printing
28—Chemicals
29—Petroleum Refining
30—Rubber, Plastic Products
31—Leather
32—Glass, Concrete, Abrasives, Gypsum
33—Metal Manufacturing
34—Metal Products
36—Electronic Appliances
37—Shipbuilding, RR and Transport Equipment
38—Measuring, Scientific, Photo Equipment
40—Motor Vehicles
41—Aerospace
42—Pharmaceuticals
43—Soaps, Cosmetics
44—Office Equipment (Computers)
45—Industrial and Farm Equipment
46—Jewelry, Silverware
47—Musical Instruments, Toys, Sport Goods
48—Broadcasting, Motion-Picture
49—Beverages
Totals

Operating companies on the chart are those *Fortune 1000* companies that
Standard Industrial Classifications. For example, there are 20 companies
(column 1) in the classification of Mining, Crude Oil Production (SIC Code
(column 5) of all 524 companies that operate aircraft in the *Fortune 1000*.

Aircraft vs. Operators

Percentage

1	2	3	4	5	6
Aircraft	Operating Companies	Operating Companies % of Total	Aircraft	Operators	Total Co's
60	20	71.43	3.26	3.82	2.80
113	50	52.63	6.13	9.54	9.50
21	7	77.78	1.14	1.34	.90
25	15	44.12	1.36	2.86	3.40
16	8	30.77	.87	1.53	2.60
5	5	45.45	.27	.95	1.10
114	29	56.86	6.19	5.53	5.10
34	10	26.32	1.85	1.91	3.80
132	38	63.33	7.17	7.25	6.00
302	35	72.92	16.40	6.68	4.80
39	11	50.00	2.12	2.10	2.20
4	2	40.00	.22	.38	.50
54	21	67.74	2.93	4.01	3.10
113	40	57.14	6.13	7.63	7.00
89	34	48.57	4.83	6.49	7.00
145	36	47.37	7.87	6.87	7.60
12	8	50.00	.65	1.53	1.60
32	12	30.00	1.74	2.29	4.00
141	22	64.71	7.65	4.20	3.40
97	13	86.67	5.27	2.48	1.50
35	13	59.09	1.90	2.48	2.20
17	5	31.25	.92	.95	1.60
30	6	22.22	1.63	1.15	2.70
162	60	61.22	8.79	11.45	9.80
5	3	50.00	.27	.57	.60
8	4	26.67	.43	.76	1.50
8	6	50.00	.43	1.15	1.20
29	11	44.00	1.57	2.10	2.50
1842	**524**	**52.40**	**100.00**	**100.00**	**100.00**

perate aircraft in each of 28 olumn 2) that operate 60 aircraft 0). This represents 3.82 percent e 60 aircraft in this classification represent 3.26 percent (column 4; of the 1842 aircraft operated by *Fortune 1000* companies. The percentage of companies that operate aircraft as opposed to those who don't in a specific category is represented in column 3. In Mining, Crude Oil Production, 71.43 percent of the *Fortune 1000* companies operate aircraft. Mining, Crude Oil Production represents 2.80 percent of all *Fortune 1000* companies (column 6).

Where The Action Is

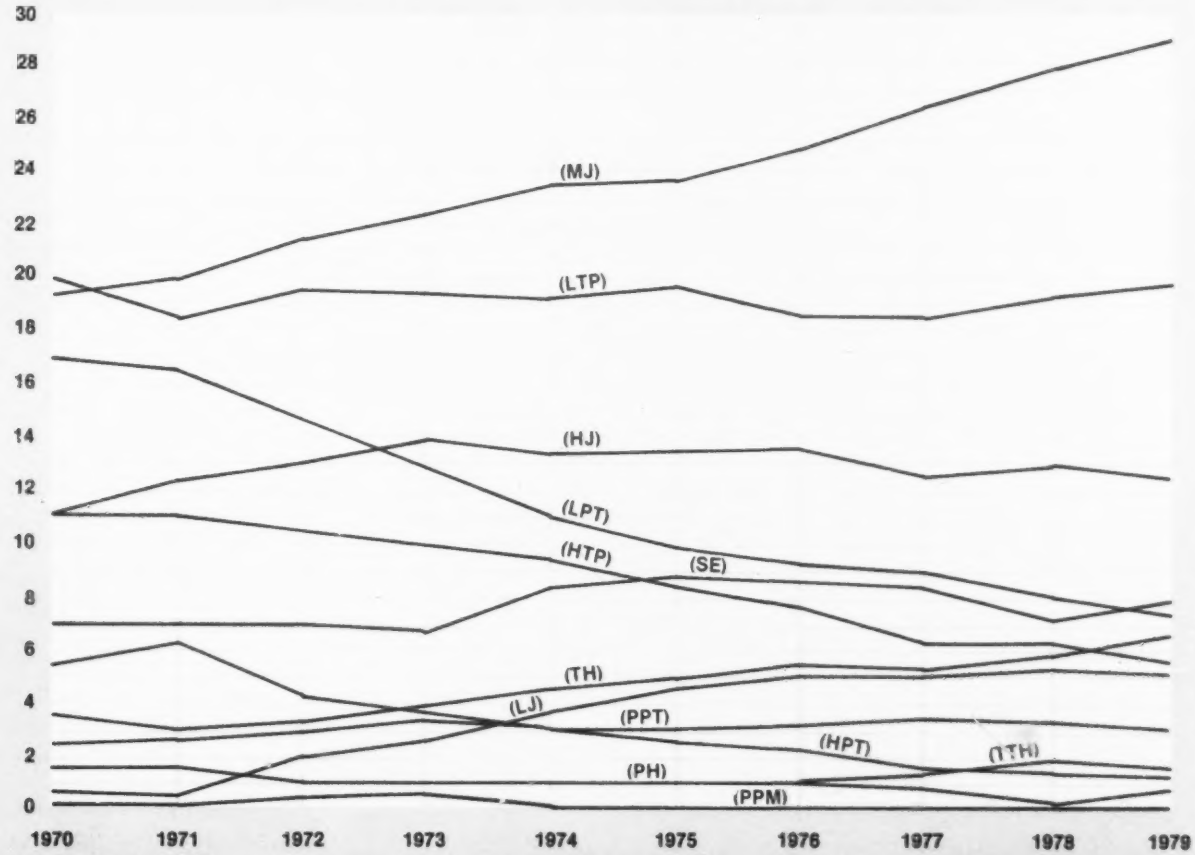
It's one thing to look at the *Fortune 1000* fleet in terms of unit growth by type. But it's another thing to look at the fleet in terms of type as a percentage of the total — in other words, the areas of growth and decline.

Plotting these percentages on a line graph covering the ten-year period of 1970-1979 is quite revealing. The light turboprop, for instance, led the *Fortune 1000* fleet in 1970 with 261 units, or 19.8 percent of the total. Despite a 38.7 percent increase to 362 units, the light turboprop has remained fairly constant in the 19 percent regime; it finished at 19.7 percent by 1979.

Biggest gainer over the ten-year period was the medium jet, which held down second place at 19.5 percent of the *Fortune* fleet at year end 1970 and jumped 9.2 percentage points to 28.7 percent by the end of 1979. The number of medium-jet units actually increased 105.8 percent during the period, from 257 to 529. Other significant gainers in market share were light jets (Cessna Citations, for which deliveries began in December 1971, account for the bulk of this increase), up 4.0 percentage points to 5.0 percent of the fleet; heavy jets (JetStars, Gulfstream II's and airline-type aircraft), up 1.4 percentage points to 12.6 percent of the fleet.

The piston aircraft fleet is interesting to follow. The light piston twins have been in steady decline since 1970, falling from 227 units to 139. The pressurized piston twins have increased from 32 to 56 units, but remained fairly constant in percentage over the entire fleet, and the heavy piston aircraft have decreased from 76 to 29 units. Single engine piston aircraft increased steadily from 1970 to 1977, showing a 25 percent increase in 1974 alone. Whether this was influenced by the 1973 fuel embargo is uncertain but, by early 1978, the

Fortune 1000 – Aircraft Type As Percentage Of Total Fleet



SE Single Engine
LPT Light Piston
PPT Pressurized Piston Twin
HPT Heavy Piston Twin

PPM Pressurized Piston 4-Eng.
LTP Light Turboprop
HTP Heavy Turboprop
LJ Light Jet
MJ Medium Jet

HJ Heavy Jet
TH Turbine Helicopter
PH Piston Helicopter
TTH Twin Turbine Helicopter

fuel situation had improved greatly, and we saw a 13 percent decrease in the *Fortune* single engine fleet. Then, when the fuel situation became more expensive in 1979, the single engine fleet increased almost 10 percent in the year.

The only other gainer in the *Fortune 1000* marketplace during the 1970-1979 period was the pressurized piston twin, which increased 0.8 percent to 3.0 percent of the total fleet, but has dropped in the last two years.

Other decliners were heavy turboprops, down 5.7 percentage points to 5.5 percent of the fleet; heavy piston twins, down 4.0 points to 1.5 percent of the fleet; and piston helicopters, down 0.9 points to 0.7 percent of the total fleet.

It is also interesting to note the *rates* of growth over the last year. Big losers confirm what had been previously said: heavy piston twins lost 11.1 percent in comparison to the fleet as a whole, and, surprisingly, heavy turboprops lost the most, at 11.8 percent. Medium jets, the biggest gainer over the ten years, only had an annual growth rate of 3.2 percent last year. Amazingly, piston helicopters had an astonishing 28.0 percent growth rate last year. That may not be too indicative of anything, however, as their fleet size is very small and any minor change will produce a voluminous change in growth.

Tying for second were turbine helicopters and single engine aircraft at 4.9 percent, next came medium jets, again at 3.2 percent, light turboprops came in as the last of the gainers at 3.1 percent.

The losers squeaked in with heavy jets at −2.8 percent, pressurized piston twins and four-engines tied at −4.0 percent, light jets yielded a −5.0 percent loss, light piston twins fell −6.0 percent, twin turbine helicopters dropped −7.0 percent, and finally heavy piston twins and heavy turboprops were at −11.1 and −11.8 respectively.

These trends of growth and decline are basically consistent throughout the period and, as such, are reflected in the single-year 1979 results, during which turbine helicopters and medium jets outpaced the total fleet growth. All sizes of pistons were slowly disappearing, and the others were more or less keeping pace with fleet growth.

Examples

SE	Single Engine	180, 185, 210, Bonanza
LPT	Light Piston Twin	Aerostar, Aztec
PPT	Pressurized Piston Twin	Chancellor, BE 58-T
HPT	Heavy Piston Twin	DC3, Mallard, 44
PPM	Pressurized Piston 4-Eng.	DC6-7
LTP	Light Turboprop	KingAir, 90, 100, 200
HTP	HTP Heavy Turbo Prop	G-1, Merlin, F-27
LJ	Light Jet	Citation I
MJ	Medium Jet	Sabreliner, Falcon 20, Citation II, Learjet 23, 24, 25, 35, 55, HS-125, Jet Commander, Westwind, Diamond
HJ	Heavy Jet	Jetstar, Falcon 50, BAC 1-11, GII
PH	Piston Helicopter	12E, S-58
TH	Turbine Helicopter	205 A, H 500
TTH	Twin Turbine Helicopter	S-76, 222

Fleet Value Increases 13 Percent

Fortune 1000 aircraft operators spent $326.3 million for new and used equipment during 1979 — a record — and took the total fleet value to just over $1.76 billion, 13 percent higher than the previous year. Of that amount, 44.9 percent, or $1,463.6 million was accounted for by medium jets, and 27.1 percent, or $883.4 million by heavy jets.

Interestingly, however, in terms of percentage increase in fleet value during 1979, piston helicopters led the way with 142.0 followed by light turboprops at 25.1, single engines at 20.2, then turbine helicopters at 18.0, light piston twins at 16.2, and medium jets at 16.0. Heavy turboprops in the fleet actually dropped 10.3 percent in value, ending the year at 102 units averaging $498,125 each. Nine heavy tuboprop aircraft dropped out of the *Fortune* fleet during the year. Grumman GI's dropped out at a 10% rate this year to account for the decline. We should also note that since 1972 there has been a 174 percent increase in the turbine helicopter fleet among *Fortune* operators, compared to a 650 percent increase in the fleet value of those turbine helicopters. This reflects not only the corporate switch from single to twin-engine machines, but the almost overnight acceptance of the corporate helicopter by non-users once it came equipped with two power plants. The availability of twin-turbine machines with single pilot IFR certification should make the twin-turbine helicopter even more attractive.

Who's Operating What

When you look at each of the 10 levels of 100 companies each within the *Fortune 1000* group, it's almost predictable who operates what type of aircraft — but not quite. For instance, in the top 500 industrials, turbojet/turbofan aircraft sharply outnumber other types. While in the bottom 500, it is the turboprop airplane that is most popular.

The same is true when considering aircraft by type. The top 100 companies lead in all cases — 57 percent of the piston singles, 27 percent of the piston twins, 37 of the turboprop aircraft, 44 percent of the turbojets/turbofans, and 66 percent of the helicopters.

When you take the top 200 industrials, they account for 73.8 percent of the singles, 44.1 percent of the twins, 51.9 percent of the turboprop airplanes, 65.9 percent of the turbojets/turbofans, and 80.7 of the helicopters. The trend is still fairly consistent in the top 300 corporations, with 82.3 percent accounted for by the singles, 59.0 percent by the twins, 63.4 percent by the turboprops, 78.7 percent of the turbojets, and 86.3 percent of the helicopters.

Below the 300 level, however, you find that 5.7 percent of the singles are operated by the 701-800 group, 9.9 percent of the twins are operated by the 401-500 group, 10.3 percent of the turboprops are operated by the 301-400 group, 6.4 percent of the turbojets/turbofans are operated by the 301-400 group and 4.3 percent of the helicopters are operated by the 301-400 group.

It is not surprising that 36.6 percent of the *Fortune 1000* aircraft operators have only one airplane each, while 21.6 percent operated only two. On the other hand, 36 companies, or 6.9 percent of the *Fortune* operators, have fleets of 10 or more aircraft each, with the largest fleets consisting of 37 aircraft.

If one were to stage a popularity contest, the Beech King Air Series would come out on top, based on number of units in the fleet — 229 or 12.4 percent. Of this 43.7 percent are the model 90. The Dassault Falcon Series is second at 146 units. In addition, there are 129 Grumman GII's in the *Fortune* aircraft fleet, 125 Learjets, 125 Sabreliners, 107 Citations and 78 JetStars.

Comparative Fleet Size

Number of Aircraft	Number of Companies
1	192
2	113
3	65
4	39
5	33
6	13
7	16
8	13
9	4
10	5
11	6
12	5
14	3
15	4
16	1
17	1
18	3
19	3
24	1
28	1
32	1
35	1
37	1
1,842	524

The average year of manufacture for the entire fleet is 1971. But for jets it is 1972; turboprops, 1971; pistons, 1969; turbine helicopters, 1974; and piston helicopters, 1967. There are a number of interesting aircraft in the *Fortune 1000* fleet. The oldest is a Travel Air, built by Walter Beech in 1929 for the Cleveland Air Races, and now operated by Pepsi for advertising purposes. LTV owns a single-place, high altitude turboprop built up from an unmanned drone design; and Dow Chemical owns an all-plastic airplane, the Windecker 7. There are several turbine conversions in the fleet including a Sikorsky S58T, a Soloy turbine helicopter, a Turbo-Goose, and a Turbo-Beaver. Aircraft making their first appearance in the fleet are the Beech Baron 56 and Travelaire, Cessna 401, Swearingen Metro Series, the Lake 4 aircraft, the Mooney 20 Series, and the Piper PA32R. Helicopter debut appearances were made by the Sikorsky S55 and S76, and also the Hughes H500 and 369D made first-time showings.

In addition, nine *Fortune 1000* companies still operate no less than 23 DC-3's. In terms of airline-type jet transports, there are 14 BAC 1-11's operated by nine companies, two Boeing 707's, four Boeing 727's operated by four companies, one Boeing 737, one DC-9, one Fokker F28, and a Convair 990 and Convair 880 operated by the manufacturer.

All in all, there are 148 different models of aircraft contained in the *Fortune 1000* fleet produced by 41 manufacturers, including predecessor companies. But eight manufacturers alone accounted for 75.6 percent of the total 1979 fleet and 88.7 percent of the dollar value. Together, Beech, Cessna, Dassault, Grumman, Hawker-Siddeley, Gates Learjet, Lockheed and Rockwell International represented 1393 units valued at $1.6 billion.

Beech led in total units with 307, followed by Cessna with 282, Grumman with 214 and Rockwell with 167. Grumman was by far the leader in dollar value with $449.1 million, followed by Lockheed with $226.3 million and Dassault with $210.7 million. The remaining five all accounted for dollar values in excess of $105 million.

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